

In the Specification

Please replace the first paragraph on page 1 with the following replacement paragraph:

This patent application claims the benefit of U.S. provisional patent application serial no.60/517,124, filed November 3, 2003,~~which is incorporated herein by~~ reference.

Please replace the first paragraph on page 6 with the following replacement paragraph:

Minimized convection currents further reduce the quantity of oxygen introduced into the melt from scrubbing of the quartz crucible walls, enabling growth of crystals having fewer defects and lower oxygen content than is possible with a conventional CZ system. The continuous flow of molten silicon from the separate pre melting chamber coupled with the addition of dopant as needed during ingot growth permits compensation for segregation and establishes a substantially uniform dopant gradient concentration axially (longitudinally) and radially in the grown crystal.

Please replace the paragraph bridging pages 13 and 14 with the following replacement paragraph:

The amount of dopant dice required is a function of the amount of dopant taken up in the crystal, as it is grown. That is, the dice simply top up that dopant which is taken up from the melt into the crystal. Adding dopant in the pre melter avoids thermal perturbations and non-uniform temperature distribution that otherwise would result from adding solid chunks of dopant into the melt. Such temperature distribution problems would arise from the latent heat of fusion and thermal capacity (~~mass x specific heat x ΔT~~) to bring the dopant material up to melt temperature. Note that such thermal perturbation

problems are much the same as when adding solid silicon feedstock directly into the melt, although very much reduced. Due to the optimized thermal gradient across the melt and the control of thermal zones in the melt by respective individually controlled heating elements, a uniform thermal distribution can be maintained across the radius of the growing crystal. Thus, the addition of dopant material at inlet **408** can provide ~~[[a]]~~ substantially uniform resistivity or conductivity ~~gradient~~ axially (longitudinally) and radially in the finished ingot.

Please replace the paragraph bridging pages 14 and 15 with the following replacement paragraph:

The continuous addition of melted silicon by the use of pre melter **208** eliminates the lost time involved and energy wasted in shutting the furnace or heating elements off to recharge the crucible **200** and remelt the silicon. The use of a substantially continuous source of molten silicon feedstock to replenish the melt minimizes the time the melt is in contact with the crucible, thus further limiting oxygen absorption into the melt. Since the raw silicon is melted within the pre-melter in very small quantities and immediately flows into the growth crucible, dwell time and surface area of contact are likewise minimized. Furthermore, there is no need to open the growth chamber to ambient atmosphere in order to replace the crucible and provide a new silicon charge, a process introducing new contamination into the growth chamber.